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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/031,617 02/27/98 CATHEY

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EXAMINER

PARK, J

ART UNIT

PAPER NUMBER

2822

DATE MAILED:

03/17/00

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

# Office Action Summary

Application No.

09/031,617

Applicant(s)

CATHEY ET AL.

Examiner

James Park

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 26-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☒ The proposed drawing correction filed on 28 February 2000 is: a) ☒ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some \* c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) \_\_\_\_\_.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

## Attachment(s)

- 14) ☒ Notice of References Cited (PTO-892)
- 15) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 16) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.

- 17) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 18) ☐ Notice of Informal Patent Application (PTO-152)
- 19) ☐ Other:

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### **DETAILED ACTION**

This office action is in response to Amendment A filed on 2-28-00.

#### ***Drawings***

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 2-28-00 have been approved.

#### ***Allowable Subject Matter***

2. The indicated allowability of claims 1-10, 12-13, and 15-24 is withdrawn in view of the reference(s) to Sukharev (5,710,079) and The Admitted Prior Art. Rejections based on the newly cited reference(s) follow.

#### ***Election/Restrictions***

1. Newly submitted claims 26-30 are directed to a species of the invention that is independent or distinct from the species originally claimed for the following reasons: the new claims are disclosing a method of deposition on any surface and the previous claims are a process for creating a barrier layer on a semiconductor substrate.

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Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 29-30 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-25 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted Prior Art in view of Sukharev (5,710,079).

The admitted prior art discloses all the limitations of claims 1-25 as follows: to form a discrete region (Fig.2 Ref.34), form an oxide layer covering the discrete region (Fig.2 Ref.36) and etching a contact opening through the oxide layer to contact discrete region and wherein the surface of the contact opening is covered with the barrier layer (Fig.2), the source gas comprises an organometallic compound (Pg.6 Lns.14-15), metallizing the contact opening with a metallization material (Fig.2 Ref.40 and 42), the barrier layer functions as a diffusion barrier to prevent the metallization material from contacting the discrete region (Pg.6 Lns.1-2), metal oxide film of the barrier layer is selected from a group consisting of a conductive metal oxide, Ru oxide film, and aluminum oxide film (Pg.6 Lns.7-13), barrier layer functions as an etch stop

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(Pg.6 Ln.9), and source gas is selected from the group consisting of aluminum trimethane, titanium tetramethane, a vaporized tantalum in the form of an organometallic compound, trimethyl aluminum hydrate, a Ru metalorganic precursor, and dimethyl aluminum hydrate (Pg.6 Ln.16). The prior art does not disclose to react the source gas with an ozone gas in a CVD process and ozone gas volatilizes and frees into the atmosphere substantially all of the carbon contained in the source gas.

Sukharev discloses all the limitations that the prior art didn't as follows: to react the source gas with the ozone gas to form a barrier layer of metal oxide film (Col.3 Lns.11-25), source gas comprising an organometallic compound (Col.3 Ln.16), and ozone gas volatilizes and frees all the carbon contained in the source gas (Col.4 Lns.14-24). Also, the listing of ranges in the claims does not automatically distinguishes the claimed invention over the cited art because it is considered to be obvious to one of ordinary skill in the art to adjust the pressures and the temperatures of the invention, since it has been held that where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. In any case, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed pressure and temperature limitations because applicant has not disclosed that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another range of pressures. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations

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are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. It would have been obvious to one of ordinary skill in the art to combine when one teaches how to lay down a certain layer in depth and the other does not but mentions that process. It would have been obvious to one of ordinary skill in the art to use ozone instead of oxygen to react with the source gas as pointed out in Sukharev. Sukharev's preferred embodiment is  $\text{SiO}_2$ , however, see Col.2 Lns.42-55 for other materials, including metals, that can be used in Sukharev's process. Moreover,  $\text{SiO}_2$  is a metal oxide.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Park whose telephone number is (703) 306-5712. The examiner can normally be reached on Monday through Friday, from 8 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 908-1782 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

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March 13, 2000



**Mary Wilczewski**  
**Primary Examiner**